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OFFICIAL PROCEEDINGS
Meeting of Sept., 1919.

Volume XVIII.
No. - - - 6

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Canadian Railway Club

MONTREAL

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CONTENTS

REPORT OF SEPTEMBER MEETING

PAPER AND DISCUSSION ON "WHY IS A HOT BOX"?

This also contains list of Subjects and Authors of Papers at meetings of all Railway Clubs.

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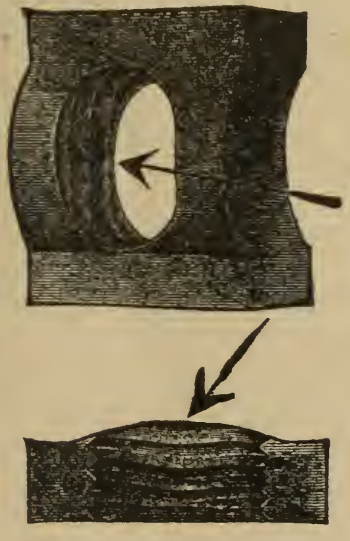

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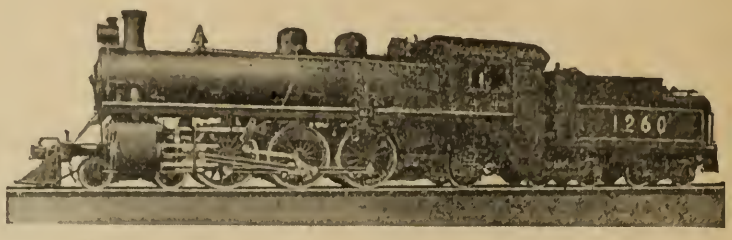

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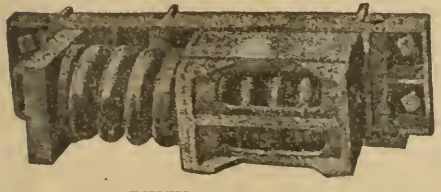

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PROCEEDINGS OF THE CANADIAN RAILWAY CLUB.

Windsor Hotel, Montreal,
September 9th, 1919.

Mr. Hendry (President) in the Chair:—

Gentlemen, please come to order. You will find attendance cards which I will ask you to fill in and sign. The next order of business is the reading of minutes of previous meeting. The Secretary informs me that these minutes have been printed and issued to each member, so that it will not be necessary to read them. The third order of business is the remarks of the President. I wish to welcome the members to the first meeting of the session and regret that I was unable to be present at the meeting in May when I received the appointment as President of this Club, but business required that I leave town a day or two before the meeting and I could not get back in time to attend. I hope and trust that we may have a good season. In conversation which I have had with the Chairman of the Subject Committee I am informed that very good papers are being prepared for this year. I will not take up any more of your time for the present. The Secretary will now read the list of applications for membership.

Secretary:

The following applications for membership have been received and passed upon by your Executive and are now submitted for your approval.

New Members.

F. A. Brooks, Canadian Bronze Company, Montreal.
A. Butler, Chief Clerk, G. M. M. Office, Canadian National Railways, 2340 Cartier Street, Montreal.
John Cameron, Clerk, 1401b DesErables Street, Montreal.
C. J. Carmody, Statistical Clerk, Vice-Pres. Office, Canadian Pacific Railway, Windsor Street Station, Montreal.
T. E. Dickenson, Engineer, Grand Trunk Railway, Montreal.
A. E. Doig, Asst. Mgr., Gutta Percha & Rubber Co., Montreal.

J. T. Filion, Asst. to Acting Supt., Canadian National Rly., Cartage Dept., Montreal.
D. Killikelly, Chief Inspector, Steel Co. of Canada, Montreal.
T. Levert, Asst. Foreman, Canadian Pacific Rly., Angus Shops, Montreal.
A. C. Loudon, Rep. Loco. Super. Company, Montreal.
D. A. Murray, Act. Supt., Cartage Dept., Canadian National Rly., Montreal.
H. F. Nowell, Mechanical Supt., C. V. R. R., St. Albans, Vt.
Wm. Pirrie, Jack Inspector, Grand Trunk Railway, Montreal.
B. W. Seton, Mgr., Dominion Engineering & Inspection Co., Montreal.
E. Thomas, Engineer, Grand Trunk Railway, Montreal.
G. E. Vincent, Conductor, Canadian National Railway Co., Charny County, Levis, Que.

Chairman:
The members have all heard the aplications as read. What is your pleasure?

Mr. E. A. Cunningham:
I move that they be declared elected.

Mr. J. Powell:
I second the motion.

Chairman:
It has been moved by Mr. Cunningham, seconded by Mr. Powell, that these gentlemen be accepted as members. Are all in favor? Please signify in the usual manner.
Carried.

MEMBERS PRESENT.

Hendry, J.	Coleman, M.	Forrester, C. J.
Battley, E. R.	Comley, W. T.	Gibson, F. J.
Black, R. H.	Cookman, R. C.	Goldstraw, W.
Boyd, Geo.	Crumpton, A.	Gregory, W. A.
Broaderip, M.	Craigie, J. H.	Hannah, W. D.
Brooks, F. A.	DeAngelis, G.	Higgins, C. L.
Brown, L.	Dickson, J. H.	Hudson, T. C.
Chisholm, J. V.	Dickenson, T. E.	Hunter, W. C.
Chown, T. C.	Dyke, H. J.	Kelly, E. A.
Clarke, J. E.	Fontaine, J. W.	Keniston, C. R.

Kennedy, R.
Krauser, W. G.
Larkin, L.
Lloyd, E. E.
Mackie, R. L. D.
Macnab, E. S. M.
Macpherson, J. B.
Meissner, O. W.
Miller, W.
Miller, M. J.
McCabe, P.
McCracken, F. C.
McCuaig, J. D.
McHattie, T.
McNair, C.
McVeigh, E. J.
McVey, W. P.
McVicor, R.
Needham, C. F.
Needham, R. J.
Nix, E.A.
Ord, L. C.
Palme, J. E.
Partridge, R.
Pearce, H.
Pepler, H. A.
Perrin, A. T.
Petersen, W. A.
Phillips, F.
Powell, J.
Primeau, J. L.
Prowse, W.
Quinn, E.
Riddington, A.
Rioux, F. W.
Robinson, E. A.
Robinson, W. A. H.
Robb, Geo.
Robbins, N. B.
Rodgers, J. H.
Rosevear, W. H.
Russell, C. H.
Shortley, B. F.
Smart, G. E.
Soltau, G. R.
Spence, W.
Starke, H. M.
Stewart, W. H.
Swinton, H. P.
Thomas, E.
Thorp, H.
Tinkler, J. E.
Watkin, B.
Wheatley, Jas.
Wickson, F. R.
Wilson, G. M.
Vollett, W. R.
Booth, W. A.
and many others

Chairman:

We shall now be favored with a paper by Mr. E. J. McVeigh, General Storekeeper, Grand Trunk Railway System, Montreal, on the subject of "Why is a Hot Box?"

"WHY IS A HOT BOX?"

Mr. President and members.—The query offered you in this little paper strongly reminds us that a person of inferior intellect may advance a proposition that a sage may find difficult of solution. In other words, a fool may ask a question a wise man cannot answer. If you will accept the part of wisdom and look for the answer, I will bear the onus of the simple, but inquiring mind.

The expression "Hot Box" is the one generally used to describe that condition which results from the journal of a car truck becoming heated.

This heating of the journal has a wide effect. It first sets fire to the waste and oil in the journal box, then it warms up the temper of the brakemen, this is transmitted to the conductor, and from him to the engineer. The next to hear of it is the dispatcher and he becomes hot. Then the trainmaster

comes in on the game and he heats up the Superintendent and the Car Department. If there is sufficient fire it gets up to the President at times and great is the "Passing of the Buck" all along the line.

The only one vitally interested who keeps cool seems to be the car knocker who puts in the new brass and dope which costs the railway anywhere from 5 to 8 dollars. He seems to be a fatalist and regards the matter as an act of God, against which it would be futile for him to rage, or get hot..

I used the expression "Passing of the Buck" in this connection, and as I am afraid some of you may not know what I mean by that, I will explain that it is merely that regular routine of our daily life wherein you attempt to get from under, and put it on the other fellow, regardless of the merits of the case.

In dealing with hot boxes, the "Buck" is a lively animal, as he has a wide field to cover, but one thing we do know and that is that we are further away from a solution of the problem to-day than we were 25 years ago.

Some young men of a serious turn of mind will no doubt resent me treating this matter in a semi-humorous manner. Well, you see we get that habit of late years. The boys at the front, you know, went out after the Hun with a joke, but he knew how deadly the thing was just the same. We at home joke about the high cost of living and other serious things, while we wear our year before last underwear and get that old suit turned wrong side out for twelve dollars because we can't pay seventy dollars for a new suit, and pay for a bond at the same time.

I really am not disposed to treat the hot box in a light manner. It is far too important for that. It means huge sums of money and danger to life and limb of the railroad man and the travelling public. Nor am I disposed to give that lively animal the "Buck" any more exercise than I can help in dealing with this matter.

There is no effect without a cause, and behind everything is a fundamental principle. The cause in the case of the hot box is 99% neglect—the effect is bad.

The first thought in the minds of some of you is to jump up and protest that word neglect, but wait awhile and see how it turns out. In dealing with hot boxes you will find the "Buck" turn up under many aliases—a few of them are: Bad oil, bad waste, bad brass, rough journal, rough truck, truck out

of square, overload, etc. Each and everyone of these spells "neglect" by someone.

A car truck mechanically correct requires very little lubrication to keep it running with cool journals. By mechanically correct we mean that the truck has been properly constructed to do the work it was intended it should do. The journals on which it rides are of a size to carry the load they will be called on to carry, the saddle, or wedge, of proper shape and the journal bearing of a quality of metal that will reduce friction to a minimum.

If we start out with such a condition, and maintain it, the question of lubrication is so simple that it is practically non-existant, or it would be if the conditions surrounding the working of a car truck were not so diversified.

Now let us glance at a concrete example. We will take a train load of grain from the west, or the lake ports. The cars are, when loaded, in fair condition, not perfect, but fair. Some of them have new journals and wheels, some of them have old. Some new brasses and some part worn. This train starts out with a locomotive that leaves it at the end of 125 miles. The locomotive is carefully looked over by the engineer and then placed in round house where other men look it over and do any repairs necessary, and it starts out on its next 125 mile run in pretty good order. At least it has had a good deal of attention paid to it.

What about the cars? They are run onto a siding and two car men start down the line to inspect the boxes. How do they do it? They pull off the box cover, glance at the end of the packing in sight, see that there is no smoke, close the lid and go on. The engineer when going around his engine places his hand on the big end, the little end, the slide bars and many other parts to note how cool or warm they may be. He knows they are not hot, but he wants to know if they are thinking of becoming hot. Does the car man do this? He does not, and the cars start out on another 125 mile run. How many hot journals are there at the end of that run? We don't know, maybe one or six. These receive attention of a kind at this stop, and on they go again.

Before they reach the end of the next run some of those that were hot have had several brasses applied to them with more or less success. Some of them are in bad shape and must be stopped for new wheels, the journals have been cut, and some that did not give trouble at the first or second stop are giving trouble now, and so it goes on to the end of the run.

Now, if these journals had all been tested with the hand at the first stop and those showing an inclination to heat given a little attention, and the same thing done as often as the engineer tested his engine, do you believe there would have been so many hot boxes on that train?

Did any of you gentlemen ever use a horse and buggy and suddenly find one of the wheels sliding and jump out and grab the nut with your fingers, and let it go again quick, because it was hot, and after it had cooled off and you removed the wheel you found plenty of oil on the journals, with the exception of a spot about half an inch wide? I have, and it made me realize that it is not necessary for a journal to be all dry to make it run hot. It is the back end of the car journal that needs attention, but how seldom it gets it until too late.

Do you agree that the hot boxes on the train we have tried to describe were due to neglect, and was that a fair skeleton description of the average train? Well, then was not it neglect to give the necessary attention that was the cause of 99% of the hot boxes. Why this neglect? Here is one reason, the railroads haul freight at so low a figure that they feel they cannot afford to have the number of men necessary to give the cars the proper attention. What you can't do yourself you must trust in Providence for, and Providence does not look after box cars.

Just here I wish to say that, in my humble opinion the men who design our cars and the men who maintain them come very near performing a miracle in keeping the number of hot boxes so low, considering the adverse conditions under which these cars must operate.

There are many other phases of this question apart from the above, and there is one that is most difficult to deal with. This is the car left at a way station or siding in winter time until the dope is completely frozen, but the car is thrown onto a train and must get along as best it can. However, the better attention at divisional points hinted at above would help greatly in these cases. We cannot, I believe, totally eliminate the hot box on freight cars, but we can reduce the number 75% by spending the money to do it.

The foregoing few words will, I hope, introduce the subject of hot boxes on freight cars, but we still have the question of the same trouble on our passenger equipment.

Some time ago I had the pleasure of looking into this matter, and after taking the statements of trainmen, trainmasters, superintendents, car men and others into account, and

also watching the "Passing of the Buck" along the line, I came to the conclusion that here again we come down to that word neglect.

In a Canadian winter our cars do have a hard time of it. Shoved into a yard with snow and ice often scraping the journal boxes, with the inside heated to 100 degrees and the outside frozen solid, they cannot be in good condition to give satisfactory service. The only answer to that problem is to have the cars placed in a building as engines are placed in round houses. Such a building should be heated to about sixty degrees and no heat applied to inside of cars. Two hours after cars are placed in such a building all snow and ice falls away from trucks and running gear, leaving the car clean for proper inspection. The dope remains in the best possible condition, and the car goes out for its run in as good shape as we can make it. I have seen cars handled in this way, and I know that the results were good.

Many people will say that it is impossible to house all of our passenger equipment, or not actually impossible, but that the cost would be prohibitive. I fully appreciate the fact that the cost would be great, that is the initial cost, but it is a question if it would not be quite as wise an investment as the round house. It would not be necessary to place every passenger car, mail car and baggage car inside of a building. Many of the spare cars could be left outside as now, but I believe that we should have buildings to accommodate all cars on our regular trains with room for a reasonable number of spare cars that should be available in case of accidents.

The cost of such buildings would be considerable, but against this cost, what would we save? I believe that this building could be heated with less fuel than is now used for keeping the interior of cars warm while standing out of doors, and that the number of hot boxes could be greatly reduced, or practically eliminated. It is hard to tell just what a hot box would cost, but we know that they cost considerable money. I also have statements from car men to the effect that in one year they have expended sufficient money in re-piping cars that have been frozen to pay for a building to protect them. This may be exaggerating, but if the saving in this direction in five years would pay for the building, I believe it would be a good investment.

There is another phase of this question that in my opinion has not received the attention that it deserves, and that is the extent to which we are using, by wear, our journal bearings.

I have made several tests of this, and have found that the quantity of brass actually used up by wear is very small indeed. We are practically running on white metal. This does not apply to any particular road, but to many roads, as I have reports from different places on the continent all bearing out what I have said.

Now, what is the trouble here? I think we can all remember when journal bearings were very much more worn in service than they are to-day. I can remember journal bearings that had never given trouble and were finally removed because they were worn so thin that there was fear of them breaking or being worn clean through, allowing the journal to come in contact with the wedge. Such a condition, so far as I know, is practically unknown to-day. It may be stated that in the days when journal bearings were so worn that our cars and loads were lighter, and this is true, but in those days our journal and journal bearings were smaller. In other words, they were designed to carry the loads of that day. The journals and journal bearings in use to-day are supposed to be designed to carry the loads of to-day They are not doing it in a satisfactory manner. Is this another case of neglect, that is, have we neglected to provide journals and bearings large enough to carry the loads?

I believe that these matters are of vital importance and they deserve all of the attention we can give them, and that any man who has an idea on the subject should feel at liberty to advance that idea. He may be wrong, as I may be in some of my ideas, but by advancing his proposition or idea he may bring out a better one, and that is what we want.

This little paper has been purposely made short. The idea being that it would merely introduce this very important subject, and I have endeavored to interest not only transportation and mechanical people, but also members of the Engineering Department, and have these people present to take part in the discussion. There are many angles to this matter, and one of these is the engineering angle, which I have not touched on at all.

In conclusion, I want to say this, this club has been in existence a good many years, that it has done some good I know, but I honestly believe that if the club will take up this question of hot boxes, and follow it through, and have their work result in the elimination of 75% of the hot box trouble of this country, it will have done a greater work than anything that it has done in its previous history.

Chairman:

Gentlemen, I think you will all agree with me that this is a very interesting paper and should bring out a lot of discussion. I would like to hear from any gentleman pertaining to this valuable paper.

Mr. W. H. Rosevear:

It is a long time since I have attended a meeting of the club, or you have heard my melodious voice in this room, so I am going to inflict you with a few remarks. First of all, I want to compliment you on the splendid audience you have here to-night. It augurs well for the success of our meetings during the coming winter. I also want to compliment the writer of the paper on producing what I was going to call a semi-serious paper. He starts out in a very jocular frame of mind, but he brings to our attention a very serious matter. It is sixteen years since I left railroading, or had any experience with the subject of hot boxes, and I thought that by this time a solution would have been reached. But it appears that we are farther away than when I left railway service. It was a very serious question then, and was dealt with extensively. I remember in one instance the Superintendent of Transportation took up the case of delays at one large terminal, due to the car inspection. Our superintendent suggested that the inspectors be supplied with bicycles, so that they could get over the ground quicker. To-night I have another solution—Mr. McVeigh has touched on the difficulty of getting lubrication at the back end of the journal. I would suggest that each inspector be supplied with an X-ray machine, so that he can examine the lubrication at this part of the box, and see that it is acting as it should do. (Laughter.) Another matter that struck me rather forcibly was Mr McVeigh's reference to journal bearings equipped with white metal. From what I have heard on this question, I was led to believe that they are putting less babbitt in journal bearings, because they are getting a much better mixture of brass than they were formerly able to do. I am glad Mr. McVeigh has taken this matter up, because he is connected with the Purchasing Dept.—there is nothing personal meant by this—and remember some years ago a certain agent came to see us in an effort to obtain the contract for brasses for one thousand box cars that were to be built. We explained to him, of course, that the whole matter was in the hands of the Purchasing Agent, and he went to see him. Some time after he came back and said: "Well, I got

that contract, but he cut me terribly.'' I replied that we would expect him to supply brasses in accordance with what we wanted, and he said, ''I will supply them according to the price,'' and that is just what we got. Some of those cars had to have all their original brasses renewed before they reached our line. Another matter is the question of housing passenger equipment. We take care of our locomotives very thoroughly, but the rest of the rolling stock does not get the attention in this respect that it should. Why?

Mr. C. L. Higgins:

I do not belong to this club now, although I did at one time. I wish, however, to tell you a story about my experience with detention to a train due to a hot box. On March 20th of this year I purchased a return ticket to Owen Sound, Ont., having to go there to inspect certain machinery, and it was very important that I reach that point on time the following day. When the train was twenty-five miles out of Toronto we came to a dead stop by reason of a hot box on the car in which I was riding. We got out and found it had burst into flames, and the engineer was out there doping the box with the conductor and trainmen assisting him. They eventually got the box cooled and we proceeded, but we reached Toronto two and a half hours late with the result that I missed the train for Owen Sound and had to stay in Toronto twenty-four hours and when I finally did reach Owen Sound the opportunity I had been looking for in connection with the purchase of some machinery had passed and the result was that several thousand dollars were lost. When I returned I called on the President of the road and told him I had reached the conclusion that the cure for hot boxes was not to let them get hot. Ordinary bearings run in oil and bear on the bottom—the car bearings bear on the top, and as the tendency of the dope is to shake down it is exceedingly difficult to keep them lubricated unless they receive constant attention. I have come here to show you something that will prevent them?

Here Mr. Higgins made a demonstration with an appliance consisting of a telegraphic relay, an electric bell, with batteries connected to two posts between which was a fusible link. He showed how this link would fuse when the temperature of a journal box reached 150 degrees and the broken circuit would result in operating an electric bell in the coach or sleeping car, which bell would ring until the box received attention. He further explained that a spring in the box

could be released by the same operation which would drive a plate holding the packing and oil up against the journal, providing lubrication automatically.

Mr. C. J. Forrester:

The paper mentions that of the trouble due to hot boxes half is due to carelessness. I think there is no appliance that is receiving more attention at the present time, but it must be remembered that when you start out with a passenger train that is running sixty miles an hour this means that the car journals are making 500 revolutions—this means that your journals have to do heavy duty and as soon as you get through the white metal you are down to the brass and the brass starts to give trouble. Forty or fifty per cent of your trouble is due to starting out with new pairs of wheels, and I think that, all things considered—ten per cent. carelessness would be a better estimate. Another thing — in examining a freight train, an inspector will examine 200 or 300 journals per day. He cannot examine the back end of every journal nor see if the white metal is worn from the brass.

In regard to the appliances suggested by Mr. Higgins, did he have in mind that the ringing of the bell in a sleeping car would waken all the passengers?

Mr. C. L. Higgins:

You have bells in the sleeping cars now and they are rung to call the porter at all times during the night.

Mr. C. J. Forrester:

Yes, but they do not ring incessantly.

Mr. C. L. Higgins:

I think a passenger would not mind being wakened up if the bell was for the purpose of having him reach his destination on time.

Mr. R. H. Black:

I think we could figure on 25 to 35 per cent. saving in fuel by heating a building instead of the cars.

As the railroads spend well over $100,000 per year in car heating in Montreal alone it seems that this is a point worth considering.

Mr. C. McNair:

Having read Mr. McVeigh's paper and being particularly

interested in the all important subject of hot boxes, wish to congratulate him in his efforts to better conditions.

The conditions, during the last few years railroads had to contend with were the worst ever experienced in regard to lubrication of their equipment. During the war there was a general shortage of railroad equipment and labor was at a premium. The United States Administration and the Canadian Railway War Board worked together, with one thought uppermost in mind, (win the war), did everything possible to keep cars moving, so much so that in many cases cars did not receive repairs which would have been considered necessary during normal times. Coupled with this, labor was so scarce that in many cases men were hired who were not efficient railroad workers, and as a last resort car foremen would give them jobs as oilers. Because they were called oilers and believing their work was pouring oil, they managed to get oil cans and poured oil in journal boxes until the wool waste became so wet and heavy that it lost its resiliency, settled away from the journals and in due time hot boxes were the result.

Railroad employees in the United States received substantial increases in wages, and later same increases were put into effect on Canadian roads, but for some reason or other employees known as oilers are paid less than car repairers, therefore it is difficult to keep good men working as oilers. I would strongly recommend that these men be paid more than repairmen, because, in my opinion, they have the most important work in a car yard. In this connection I would also recommend that they be given a better or more important title than "oilers." They are deserving of a real fancy name.

For years instructions were issued showing the proper method of packing boxes (and a great many of the roads endeavored to carry out these instructions) which explained that a roll of waste be formed and applied to back of box, then packing put in from this roll up to the inside of collar at end of journal, then a plug or key applied in front of box, the packing in no case to extend above centre line of journal. In many cases however the packing was put in above centre line, the front plug was made of such dimensions that occasionally we would open the box cover and could not see anything but packing. Latterly some of the roads got away from this process by discontinuing the use of the end plug entirely. It was found that this practice gave inspectors a better opportunity to examine the box and bearings, and by watching for dry centres of journals, bearings which would likely run hot were

detected, the cause discovered and the necessary remedy applied. This change has done a great deal to eliminate hot boxes.

Our Canadian roads have been slow in making this change however and they lose considerable material when their cars go over into the States on account of these front plugs (which would weigh about one pound of packing in each box) being removed on other railroads and on returning our railroadmen put extra plugs back in cars which have had them removed.

I have been associated with the Grand Trunk Railway for the past six years in lubricating their equipment and I do not hesitate to say that there are less hot boxes to-day than ever before per thousand car miles run.

The Secretary:

I do not wish to hurt the feelings of any of our oil representatives here to-night, but in conversation with a conductor of a freight train some tme ago, he seemed to have gotten out a substitute for oil. He said that whenever he had a hot box he ran back to his van and got some wood ashes out of the caboose stove, mixed them with the oil, and got to his destination without much trouble. You can take that for what it is worth. I think the shop people are sometimes to blame in that they at times will leave a knob or other irregularity on the top surface of the brass or key, and if this is not chipped off or removed it will likely result in a hot journal.

Mr. L. C. Ord:

Gentlemen, when I came here to-night and heard the discussion on hot boxes, the fact they are with us still, and just as divergent opinions as ever regarding them—I knew indeed I was home again.

I do not know much about hot boxes to-day, but I have had a great deal to do with efforts to prevent them in the past.

One speaker says most of the cars are running altogether on brass, another that they are running almost altogether on white metal. Both cannot be right.

My personal opinion is that investigation will show that on most roads, and particularly in passenger service, more cars are running on white metal.

A very important point in comparison of hot boxes to-day and years ago is in the diameter of the journals. A six inch journal is moving across the brass at twice the speed of a say

three inch journal in the same train and even with the same load per square inch, is harder to keep cool.

Another important factor is end wear. The bearing area at both ends of the brass has not increased in proportion with the weight of the car and end wear is greater and the lateral movement of the journal on the brass has a great deal to do with the displacement of the packing in the box, particularly in cold weather and in starting warming at the inside shoulder.

There is another factor which is very important in so far as Canadian roads are concerned, and it is the question of low temperature. Railroading in Canada would be all right if it was not for the severe winters, and it is difficult during that season of the year to attend to journal boxes.

The cost of brass is going up, but it is a question if the cost of materials is advancing any faster than the labor costs.

I have been away for some time but am glad to be with you again to-night and to see the fight going on in just the same old way.

Mr. E. J. McVeigh:

When Mr. Ord got up to speak he said he did not know anything about hot boxes. He evidently knows more about the subject than I ever expect to know. I would like to get an expression from him on this end wear proposition as I have been told that is where some of our trouble lies. In conjunction with that end wear there is the question of the cone wheel. I am merely looking for information. Does the cone wheel give a more erratic movement on rail and more end wear than the flat tread on the rail? This is a matter upon which I would like to receive some information.

Mr. L. C. Ord:

As the question has been put directly to me perhaps I should answer it. The cone on the wheel is to assist in curving and to reduce flange wear. The question of sharp flanges bears on the same point. When you measure them up you never find a sharp flange without finding a large wheel and a smaller wheel on the same axle. It may be due to bad mating in the first place, or to unequal hardness of the two wheels, one wearing faster than the other in service. These wheels would hold steadily to the worn flange on straight track. The new coned wheel does very little "hunting" from side to side on the rail. The side movement of the brass on the journal is

caused by the swaying of the car body, due to track and service conditions and not to the wheels.

The lateral wear of the brass is affected by the lubrication on its face and on the inside edge, which latter is a hard place to get at and the hardest place to lubricate, due to the displacement of the packing by the plunger action of the journal. If you had an X-ray machine and could examine carefully and readily the back end of the box at all inspection points you could prevent 75% of the hot boxes.

Mr. C. M. McNair:

This is the second time to-night that I have heard the X-ray machine mentioned. I might say that we now have an X-ray which is in the shape of an iron made of such dimensions that it will reach the back end of box, and it is possible not only to know how much packing there is, but to adjust same to the journal.

The fundamental principles in car lubrication are, first materials, second preparation of materials and third their application. If these principles be given the necessary attention hot boxes would disappear entirely.

Mr. R. McVicar:

We have with us to-night Mr. Reid, Superintendent of the Carriage and Wagon Department, Midland Railway, Derby, England.

Mr. R. W. Reid:

Mr. President and gentlemen, I am very much interested in listening to this paper on hot boxes. I am engaged on a railway in England where the hot box trouble is not unknown. As you probably know, a very large proportion of the wagons are private property, and a large number of these wagons are lubricated by grease which is fed through holes in the brass at the top. That practice has been found unsuitable for freight and passenger vehicles running at high speed, and 90 per cent of the vehicles in fast freight trains run at a speed of fifty miles per hour, and are running in oil bearings which are faced with white metal. We never count on the bearing wearing through. Several gentlemen here have referred to the quality of white metal and it is a very important thing. If you buy white metal indiscriminately you will find its largest constituent will be lead, and lead is not suitable for carrying heavy weights. To give you a good running bearing it must have a large proportion of tin

in it. Most of the English railways lubricate the journals by pads carried on springs in a frame. This pad can be taken out. One or two of the roads use waste packing. Since the war there has been a common use of wagon stock and my railway—the Midland—and some of the others, have taken a record of the number of hot boxes occurring on freight trains, and also the type of box and the packing, and our opinion is quite definite that the waste packing is inferior to the pad. Some gentlemen have referred to the difficulty of examining the back end of journals. That does not exist where you have the pad. Altogether the pad has everything to recommend it. You speak of the difficulty of operating in this country on account of the severe weather. If you use mineral oil, as we do, this oil does not freeze until the temperature gets very low, but if you have water in your box which is picked up when the engine lifts water at the troughs you then have ice on the top and the bottom of the oil well. The waste packing has very little resiliency, and, with the present tendency to economy, the waste is taken out and cleaned and put back again, and it is then not as good as when it is new as the horse hairs or other springing materials have been taken out. I do not know whether you have tried the pads. If you have, it would be interesting to hear what results were obtained from them. We have another type of box used in India, where they have extreme heat, and they use an eccentric steel disc which is fastened on the end of the journal. The oil lies in a well in the box and the disc picks it up and throws it over the bearing. This box has given very satisfactory results. It is patented, however, and we have never used it in England. I thank you for the opportunity of speaking to you.

Chairman:

We are very pleased to hear from Mr. Reid, and his remarks have been very interesting.

It is always a pleasure and privilege to get the views of men of experience from the Mother Country where conditions differ somewhat from our own.

Mr. Geo. E. Smart:

We have had a very free and interesting discussion on this question of hot boxes and I congratulate Mr. McVeigh for his splendid paper on this subject. There is no doubt that all railways are troubled with hot boxes on their equipment, but there has been a big reduction in the number during the last

few years, due to better methods of taking care of the equipment.

I would like to discuss some of the points raised by Mr. Reid on the different appliances used on the British railways. A number of years ago suburban trains were equipped on the Grand Trunk Railway with ring oilers somewhat similar to the design used on electric and other machinery. They were a success during certain periods of the year, but failed during the extreme winter weather, resulting in some cases, in burning off the journal and skidding the wheels. The pad system was also tried out in this country on trains running between Montreal and Ste. Agathe, on the C. P. R. This also was a success during summer weather, but gave trouble during the winter months. The pads were held or pressed up against the journals by means of small coil springs which were rivetted to a metal frame inserted inside of the journal boxes, but the extreme cold was the cause of the springs breaking away from the frame, resulting in the pad not being held in contact with the journals, and in each case the railways went back to the ordinary saturated waste for packing the boxes, and there is nothing yet, that I know of, that will give any better result than this method.

Mr. B. C. Gesner:

I am not a member of this Club, but I listened with very great attention to all that has been said, as I have had something to do with hot box troubles in my time and when we come right down to the final analysis of the question it figures out in dollars and cents. I am, in a way, connected with the Canadian National Railways, and have had a certain degree of supervision over the lubrication of their rolling stock for a number of years past.

I do not agree with the statement made that we are farther away from the solution of this matter than we were twenty years ago, as I know that twenty-five years ago it was a common thing to see a freight train with two or three boxes smoking and others on fire, but you do not see this now.

I have been wondering if any one was going to say anything on what I consider to be the vital point in the whole matter. We have heard about the wearing of the white metal lining down to the brass and the serious results which follow. Now in my belief this is purely a question of magnetism, but if you talk to the ordinary car inspector about

magnetism, you might as well talk to him about the number of feathers in an angel's wing.

There are some metals that have the same megnetic conductivity, but there are no two metals or combination of metals that have exactly the same conductivity and when you get the bearing worn down and allow the two metals to come together in an infinitesimal microscopical sort of a way, still they are big enough to cause a lot of trouble. In my opinion this is one of the largest elements in the whole thing.

In so far as end wear is concerned, in examining journals you will find that in turning them up they are carefully chamfered off at the end of the collar outside, but the inside is left perfectly square and the result is that we have a lot of them that is not circular getting into service.

Some time ago I suggested that this method be changed and the inside corner of the collar be chamfered slightly the same as the outside and whenever this plan has been adopted it has saved an immense amount of trouble, particularly on new equipment. This, and the question of magnetism, are really bigger than most people think.

I remember a case of some years ago where a big manufacturing plant required 500 coal cars for their own use. When they came to make the car brasses they picked up all the old scrap brass they could find about the place and put it in the mixer. Of course, the product looked like car brasses, but when the cars were turned out they did not run 200 miles light before they had to be re-brassed. The general manager sent for me and I put some of these brasses under the steam hammer and broke them through the centre and I found that they were more or less full of steel filings, borings and lathe chips. Apparently they did not take care enough in running their magnet through this stuff to pick out the steel and iron refuse before it was melted. When the brasses were replaced with the proper mixture the trouble disappeared immediately.

If proper attention is given by the builders and the Railway people there will not be so very much trouble with hot boxes. I do not know just what the figures are, but I am sure that the proportion of hot boxes now is not one-tenth of what it was twenty-five years ago. I would not like to think that the work of the Galena Oil men and the Railway people has all been expended in vain in the last twenty or twenty-five years.

Mr. E. J. McVeigh:

When I prepared this little paper there was absolutely no desire to criticize anyone, but a few slight exaggerations were slipped into it with the hope that they would stir someone to get up and say something, and it has resulted in some very good things being said. I freely forgive everyone for anything I have been accused of.

Mr. Norman Holland:

Mr. Gesner has brought up the question of the metals used in connection with the journals. He has referred to the electrical relations of these metals to each other, This question of the electro-positive and electro-negative relations of the various metals undoubtedly has some bearing on the question of journal troubles. The influence exerted may not be very great, but it is still quite sufficient to enter into the matter.

I wonder to what extent the Railways check up the analyses of the various bearing metals they buy? Do they know they are getting a composition that will stand the enormous stresses put on a journal bearing? Do they know what proportion of tin they get in relation to the lead used? We all know that owing to the high price of tin the tendency of the babbitt manufacturers is to increase the lead content as much as possible. These are most important points.

There is no doubt but what the question of hot boxes can be solved to a large extent if the railways will give the matter the proper attention. Mr. McVeigh has pointed out a number of ways in which the matter could be helped. We have a factory in which we use nothing but double ball bearings. These require attention only once a year. They have now been running for nearly ten years and have never given us any trouble. Has any railway ever tried the ball or roller bearing and would it be possible to use either of these in railway equipment?

Mr. B. C. Gesner:

In the matter of magnetism, I think it was in Kemp's Engineers' Year Book for 1893 or 94 that I saw this fully explained and they gave a table of the results of some tests that were made, I think at the Woolwich Arsenal.

Mr. C. L. Higgins:

On the Canadian Pacific some years ago roller bearings

were used running out of Ottawa. I would like to know something about them.

Mr. Geo. Smart:

I remember we had to take those roller bearings off during the winter months.

Mr. B. C. Gesner:

Another thing I should have said here is that in the ultimate the whole question of hot boxes resolves itself into the question of dollars and cents. When I started in on the question of lubrication of rolling stock on the Canadian Government Railways twenty odd years ago, I think the cost of lubrication was 28 cents per thousand miles on freight cars and now it is three or four cents per thousand miles. One hot box creates an expense equal to about 14 boxes running in good condition. We have got down now, according to the last figures I saw, to 4½ cents, and if that figure can be reduced to 1⅛ cents, I would like to know how it can be done.

The Secretary:

We have heard from the railroad representatives and also the oil representatives. I think it would be fitting if we could hear from some of the brass and white metal manufacturers.

Mr. G. E. Smart:

May I answer a question asked by my neighbor Mr. Holland?

Mr. Holland wishes to know if the Railways analyze their journal bearings. Bearings are analyzed by the Inspection Companies before they are accepted from the manufacturers.

Mr. B. C. Gesner:

Another way of testing this out is to take a fifty cent piece and lay it on a piece of polished zinc, put an angle worm on the 50 cent piece and he will stay there until he dies, for the moment he tries to get off he gets an electric shock and jumps back. You can get a similar result by touching them to your tongue. There are full details of all this in Kemp's Engineers' Handbook for 1893 or 1894. It gives a number of details of some very interesting tests.

Mr. G. M. Wilson:

I have much pleasure in moving a vote of thanks to Mr. McVeigh for his interesting paper, but before doing so might say that I agree with him on hot boxes.

I can say the remarks made by Mr. Booth that shop practice has something to do with the heating of journals brought to mind a case that quite recently came under my personal observation. We turned an engine out of the shop to make its customary trial run across Victoria Bridge, but before it had gone very far one of the tender journals ran hot. The wheels were removed for inspection of the journal and to all appearance it was parallel and smooth. I had it properly cleaned for further inspection and upon pressing with my finger and thumb and running them around the journal, I discovered that slight regularly spaced corrugations bounded its circumference.

Either the undrilled centre bottom in that journal, or a chattering axle lathe bearing, or a combination of both, together with careless inspection certainly caused that hot box.

I came to the conclusion that, so to speak, if a journal is perfectly round, perfectly parallel, perfectly smooth, and perfectly lubricated, it will never run hot.

Mr. W. D. Hannah:

It affords me much pleasure in seconding the motion.

Chairman:

It has been moved by Mr. Wilson, seconded by Mr. Hannah, that a vote of thanks be extended to Mr. McVeigh for his paper.

All in favor please signify in the usual manner.

Carried—(applause).

Mr. E. J. McVeigh:

I thank you, gentlemen, very heartily for the reception you have given this paper, and for the splendid discussion upon it. If a few stones have been thrown at me for presuming to write such a paper and bring it here, then my object has been achieved, for the intention was to start something and give everybody a chance to get into it. I had one fear and it was this: Some men are very sensitive, and I might hurt some one's feelings. I remember some years ago a case where a man went into the chicken business—in fact, he kept so many chickens he had to have a hired man to take care of them. The hired man became so

attached to his business and was so proud of his hens that when anyone mentioned rotten eggs anywhere he wanted to kill them. I am glad there has been such a good discussion on this subject of hot boxes and hope this is not the end, but that the question will be carried farther. We have made considerable advance in the elimination of hot boxes, but we all want to do even better. I thank you, gentlemen.

Chairman:

At our October meeting we shall be favored with a lecture by Major S. J. Robins, entitled "Competition, Combination and Co-operation."

Chairman:

The Secretary advises that coffee and sandwiches have been provided in the room at the rear, and we wish all to stay and partake of them.

INDEX OF
PAPERS AND THEIR AUTHORS

PRESENTED BEFORE RAILWAY CLUBS DURING THE SEASON OF 1918-1919

COMPILED BY THE SOCIETY OF RAILWAY CLUB SECRETARIES

NEW YORK RAILROAD CLUB

Harry D. Vought, 95 Liberty Street, New York City, Secretary.

September 20, 1918—"Architecture and Construction of Bridges." By CHARLES EVAN FOWLER, Consulting Engineer.

October 18, 1918—"Shop Supervision." By FRANK MCMANAMY, Asst. Director, Operation, U. S. R. R. Administration.

November 15, 1918—"Fuel Conservation." By EUGENE MCAULIFFE, Mgr., Fuel Conservation Section,, U. S. R. R. Administration.
"The Responsibilities of General Officers for Fuel Economy." By R. J. PEARSON, Federal Mgr., N. Y., N. H. & H. R. R.
"Co-operation on Fuel Conservation." By D. R. MACBAIN, Supt. Motive Power, New York Central Lines.
"Supervision and Fuel Economy." By ROBERT COLLETT, Regional Supervisor, Fuel Conservation Section, Eastern and Allegheny Regions.
"The Fuel Situation in New England." By Mr. B. B. POLLOCK, Federal Administrator, B. & M. R. R.

December 20, 1918—"Work Done by American Forces in France." By Col. HENRY C. BOOZ, Corporate Chief Engineer, Penn. R. R.
Address by Lieut. Commander DEXTER C. BUELL.

January 17, 1919—"The Future Status of the Railroads." By C. A. MORSE, Asst. Director, Operation, Charge of Engineering and Maintenance, U. S. R. R. Administration.

February 21, 1919—"The Arithmetic of Railroading." By Prof. W. J. CUNNINGHAM, Mgr., Operating Statistics Section, Division of Operation, U. S. R. R. Administration.

March 21, 1919—"Supply Men's Night."
"The Consulting Specialist." By A. L. HUMPHREY, Pres., Westinghouse Air Brake Co.
"The Contributions of the Engineers of the Railway Supply and Equipment Companies Towards Increasing the Efficiency and Capacity of Railway Operation." By WILLIAM E. WOODWARD, V.P., Lima Locomotive Works, Inc.
"Unscientific Characteristics of Railroad Purchasing." By Dr. W. F. M. GOSS, Pres., Ry. Car Manufacturers Association.

April 18, 1919—"Reduction of Fuel Consumption on the Northern Pacific Railroad." By M. A. DALY, Fuel Supervisor, N. P. R. R.

May 16, 1919—"Railroads of Foreign Countries." By ALPHONSE I. LIPETZ, Chief, Russian Mission of Ways and Communications.

"Railroads of Bolivia." By PHILLIP W. HENRY, V.P., American International Corp.

"Japan's Railroads." By K. YAMAGUCHI, American Representative, Japanese Govt. R. R.

"Railroads in South America and Spain." By FRED LAVIS, American International Corp.

CENTRAL RAILWAY CLUB

Harry D. Vought, 95 Liberty Street, New York City, Secretary-Treasurer.

November 14, 1918—Topical Discussion. "What Railroad Men Have Done to Win the War."

January 10, 1919—"Conservation of Fuel." By D. C. RANDOLPH, Asst. Supv., Fuel Conservation Section, U. S. R. R. Administration.

March 14, 1919—"Unification of Inspection and Maintenance of Car Equipment." By J. J. TATUM, Gen. Supv., Car Repairs, U. S. R. R. Administration.

May 9, 1919—"Modern Railroad Power Plants. Their Care and Management and its Connection with Fuel Conservation." By WILLIAM OLSEN, Supv., Steam Plants, M. P. Dept., N. Y. C. R. R.

NEW ENGLAND RAILWAY CLUB

Wm. E. Cade,, Jr., 683 Atlantic Avenue, Boston, Mass., Secretary.

October, 1918—No meeting on account of the influenza epidemic.

November 12, 1918—"Looking Forward." By J. H. HUSTIS, District Director of New England Railroads.

December 10, 1918—"Fuel Conservation." By ROBERT COLLETT, Asst. Mgr., Fuel Conservation Section, U. S. R. R. Administration.

January 14, 1919—"The Oxy-Acetylene Process in Railroad Shops" By W. L. BEAN, Mechanical Assistant, N. Y. N. H. & H. R. R.

February 11, 1919—"The United States Railroad Batteries in France." By D. C. BUELL, Lieutenant Commander, United States Naval Reserve Force.

March 11, 1919—Annual Meeting, Election of Officers and Reports, together with Annual Entertainment.

April 8, 1919—"Progress in Railroad Engineering and Maintenance." By J. C. IRWIN, Asst. Valuation Engineer, Boston & Albany Railroad.

May 13, 1919—"Co-operation, Not Competition is the Life of Trade." By Hon GEORGE J. BURNS, President of the Burns System, Inc.

ST. LOUIS RAILWAY CLUB

B. W. Frauenthal, Union Station, St. Louis, Mo., Secretary-Treasurer.

May 10, 1918—"Some Important Points in the Design of Box Bolsters." By LOUIS E. ENDSLEY, Professor Railway Mechanical Engineering, University of Pittsburgh, Pittsburgh, Pa.

June 14, 1918—"Major F. W. Green's Letter from France."
July 12, 1918—"Major F. G. Jonah's Letter from France."
August 9, 1918—"Secretary's Announcement."
September 13, 1918—"The War Worker—Here and There." By COLIN MCRAE SELPH, Postmaster, City of Saint Louis.
October 11, 1918—"Secretary's Announcement."
November 22, 1918—"Students' Army Training Corps." By Prof. ALEXANDER S. LANGSDORF, Dean of Engineering and Architecture, Washington University, St. Louis, Mo.
December 13, 1918—"McAdoo—McAdooing—McAdid—McAdone—McAdieu."—Secretary's Announcement.
January 17, 1919—"American Editor's Trip to the War Zone."By E. LANSING RAY, President of the St. Louis *Globe-Democrat*. Informal Remarks on the War by GUS V. R. MECHIN, President of the French Society of St. Louis, and by Lieut. WM. H. LEAHY, Company H, 138th U. S. Infantry.
February 14, 1919—"The League of Nations." By Hon. CHARLES M. HAY, Attorney-at-Law, St. Louis. Informal Address by F. G. JONAH, Chief Engineer, St. Louis-San Francisco Railroad and by JAMES A. SOMERVILLE, Gen. Supt. Transportation, Missouri Pacific Railroad.
March 14, 1919—"Unification of Telegraph and Telephone Facilities in St. Louis-East St. Louis Terminal District." By FREDERICK E. BENTLEY, Supt. Telegraph, St. Louis-East St. Louis Terminal District. Informal Address by Lieut. Col. FREDERICK W. GREEN.
April 11, 1919—"Proper Loading and Handling of Live Stock." By Dr. W. J. EMBREE, Chief Veterinary, Western Weighing & Inspection Bureau, National Stock Yards, Illinois. Patriotic Address by Rev. JOHN BODEN.
May 9, 1919—"The Operation of Federalized Railroads Under War Conditions." By CARL R. GRAY, Former Director of Operation, U. S. R. R. Administration.

CANADIAN RAILWAY CLUB

W. A. Booth, 131 Charron St., Montreal, Secretary.

May 14, 1918—Annual Meeting and Election of Officers.
September 10, 1918—Paper and discussion on "Passenger Car Cleaning on the Canadian Pacific Ry." By Mr. E. ELEY, Master Car Builder, Eastern Lines, C. P. Ry., Montreal.
October 8, 1918—Meeting adjourned on account of influenza epidemic.
Nov. 12, 1918—Paper and discussion on "Co-ordination of the Various Branches of the Mechanical Departments." By Mr. W. U. APPLETON, Supt. Motive Power, Canadian National Railways, Moncton, N.B.
December 10, 1918—Paper and discussion on "Car Trucks." By Mr. L. BROWN, Supv. Angus Car Shops, C. P. Ry., Montreal.
January 14, 1919—Paper and discussion on "Preservation of Railway Ties." By Mr. H. K. WICKSTEED, Canadian Northern Railway, Toronto, Ont.
February 11, 1919—Paper and discussion on "Storage of Coal and Spontaneous Combustion." By Mr. S. H. PUDNEY, Fuel Inspector, C. P. Ry., Montreal.

March 11, 1919—Paper and discussion on "History of Varnish Making from B. C. to the Present Day." By Mr. NORMAN HOLLAND, President Holland Varnish Co., Montreal.

April 8, 1919—Paper and discussion on "Preblems in Design and Maintenance of Car Trucks in Relation to Maintenance of Roadway." By Mr. W. J. HYMAN, Chief Draughtsman, Car Dept., Grand Trunk Railway, Montreal.

SOUTHERN AND SOUTHWESTERN CLUB

A. J. Merrill, P. O. Box 1205, Atlanta, Ga., Secretary.

January, 1918—"Car Construction and Maintenance of Passenger and Freight Equipment." Presented by Mr. D. D. WILSON, Knoxville, Tenn.

March, 1918—"The Duties of Car Foremen and Their Relation to Car Shortage." Presented by Mr. C. E. PATTERSON, Port Tampa, Fla.

May, 1918—"Fuel Conservation." Presented by Mr. A. P. WELLS, Savannah, Ga.

July, 1918—"Shocks in Long Passenger Trains." Presented by Mr. ROBERT BURGESS, Atlanta, Ga.

Sept., 1918—"Mechanical Stoking of Locomotives." Presented by Mr. W. S. BARTHOLOMEW, Pittsburgh, Pa.

November, 1918—"Fuel Conservation." Presented by Mr. B. F. FEENY, Atlanta, Ga.

January, 1919—"Electric Car Lighting." Presented by Mr. C. R. SUGG, Wilmington, N.C.

March, 1919—"Safety." Presented by Mr. T. R. JONES, Savannah, Ga.

May, 1919—"Tonnage Rating." Presented by Mr. J. LOWELL WHITE, Wilmington, N.C.

THE RAILWAY CLUB OF PITTSBURGH

M. J. Hepburn, 102 Penn. Station, Pittsburgh, Pa., Secretary.

September 26, 1918—Topical Discussion. "Less-Than-Carload Freight Business in Pittsburgh and the Question of Store Door Delivery."

November 21, 1918—Annual Meeting.

December 19, 1918—"Supervision." By J. L. WILKES, Supv. Transportation, Allegheny Region, U. S. R. R. Administration.

January 23, 1919—"U. S. Naval Railway Batteries in France." By Lt. Commander D. C. BUELL, U. S. N. R. F.

February 27, 1919—"Safety from the Standpoint of Industrial Efficiency." By C. W. PRICE, Gen. Mgr., National Safety Council.

March 27, 1919—"Locomotive Operation—Uniform Instruction." By J. R. ALEXANDER, G. R. F. of E., P. R. R.

April 24, 1919—"An Evening's Journey Among the Stars." By Dr. FRANK JORDAN.

RICHMOND RAILROAD CLUB

F. O. Robinson, Eighth and Main Streets, Richmond, Va., Secretary-Treasurer.

NO MEETINGS DURING AND SINCE THE WAR PERIOD.

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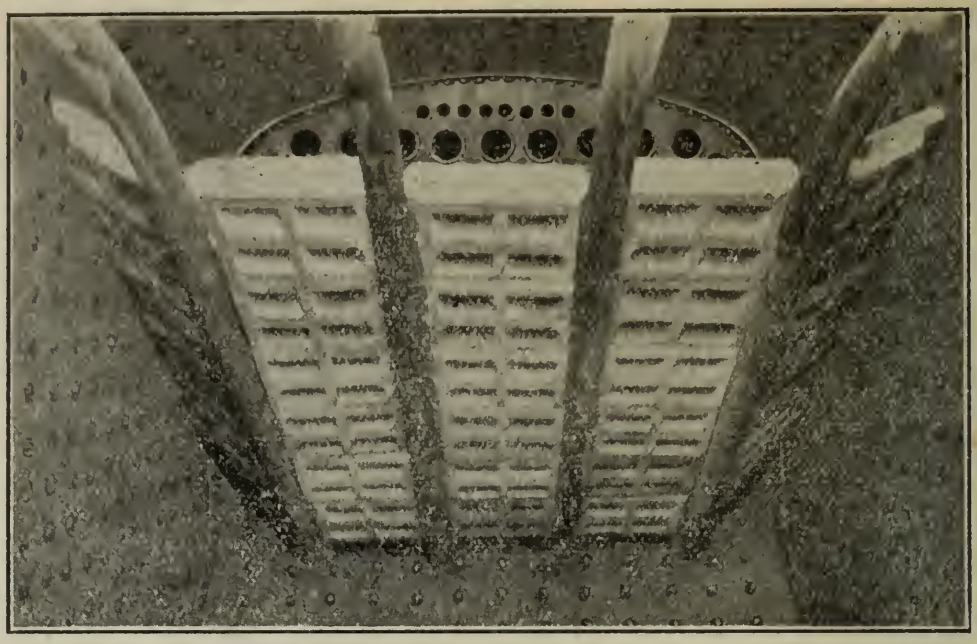
Secretary-Treasurer, HARRY D. VOUGHT, New York Railroad and Central Railway Clubs, New York City.

In Memoriam

M. E. CASEY	-	Died **June 28, 1919**
L. E. A. CHOLETTE	-	" **May 13, 1919**
C. H. GOULD	-	" **July 30, 1919**
A. M. HANNAH	-	" **Feb. 15, 1919**
A. G. MACPHERSON	-	" **Aug. 30, 1919**



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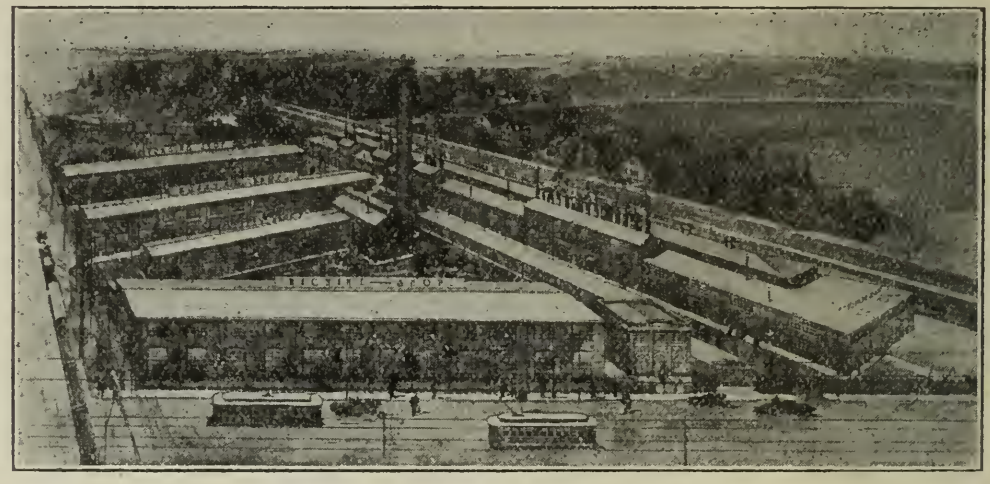

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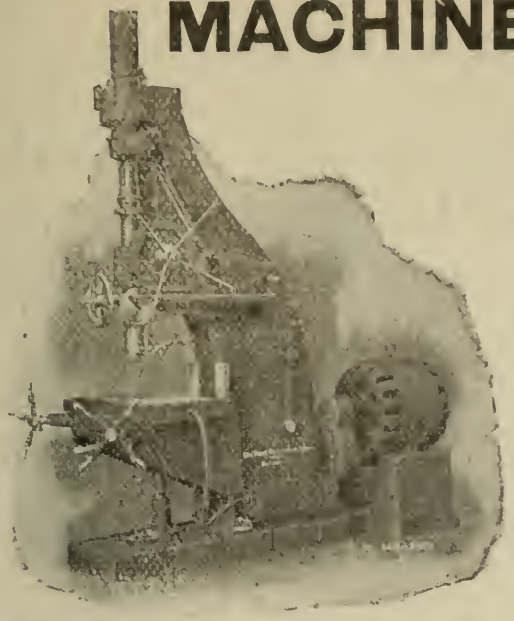

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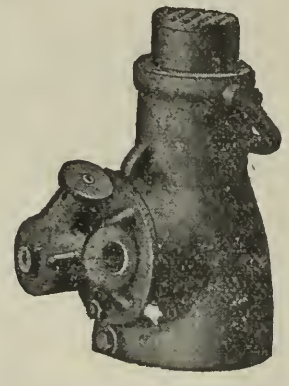

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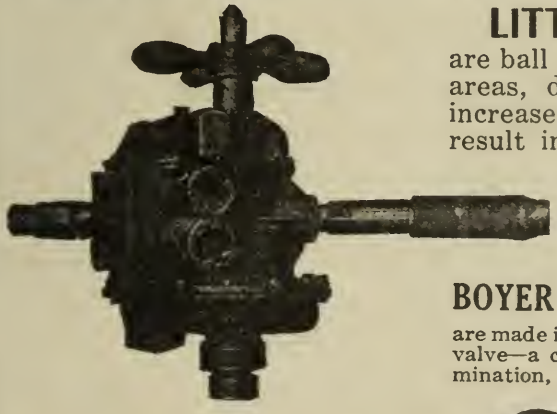

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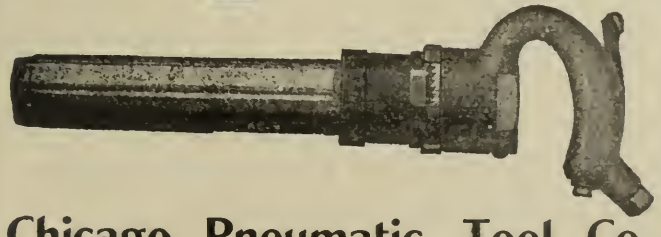

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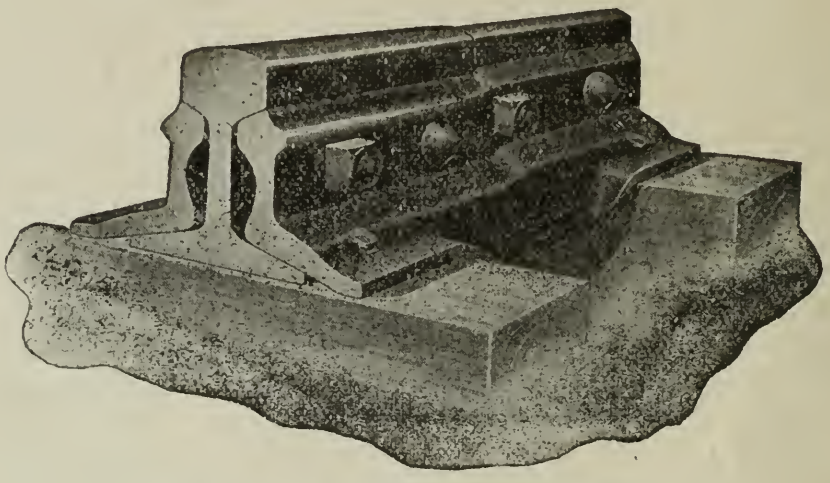

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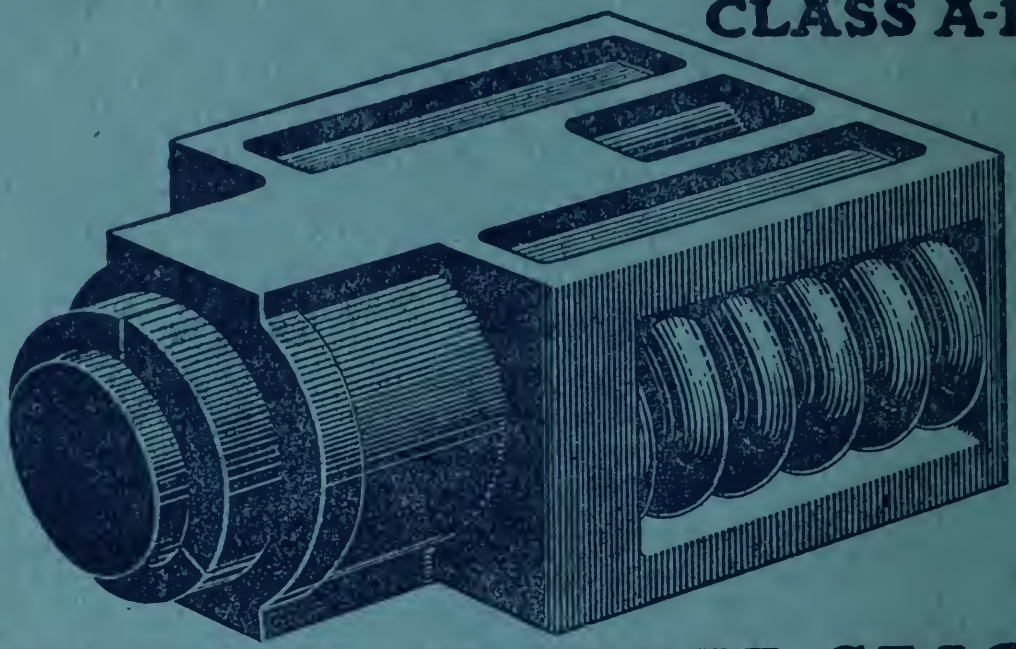
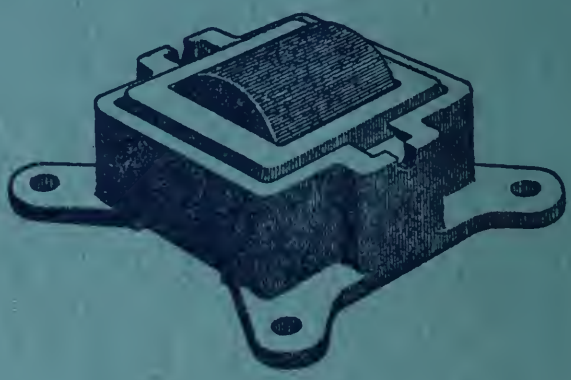


THE PERFECT DRAFT GEAR

MINER ROLLER SIDE BEARING



SAVES RAILS, WHEELS AND COAL

W.H.MINER, CHICAGO.